

Origin of the Pteridophyte Flora of The Bahamas, Caicos and Turks Islands

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The region under consideration might be likened to the open mouth of a vast sack of tropical and subtropical plants of all categories. It is a region, excluding Bermuda, that is occupied by the farthest northeastward extension of floristic elements which have their optimum development to the south (in Cuba, Hispaniola, and Puerto Rico) and west (in Florida). Subtropical southern Florida and its keys also have been recipients of the Greater Antilles flora.

According to the best authorities, the geological processes of emergence and subsidence have affected the low-lying Bahamas more than once in the past. During periods of greatest emergence, the islands of the relatively shallow Little Bahama Bank (primarily Grand Bahama and Abaco) were connected. The same is true of the islands of the Great Bahama Bank (primarily New Providence, Eleuthera, Cat, Exuma, Long and Andros). However, the great depth of water between the two banks has precluded their ever having been connected. All of the islands scattered to the south of the Great Bahama Bank also have such depths of water between them that apparently they have never been connected; the main islands in this group are San Salvador, Crooked, Acklin, Mariguana, Inagua, Caicos and Turks. Finally, the great depth of water between all of the above islands and Florida, Cuba, and Hispaniola would appear to have prevented their ever having been connected, except for a possible connection of Great Bahama Bank with Cuba during the last Ice Age, about 25,000 years ago. That connection would account for some of the animal life now known to occur on some islands in this region. The dissemination of plants into the islands from the south and west has had to rely entirely upon agencies other than overland migration, since such routes apparently have never existed.

Although there are several factors that affect the introduction and distribution of plants in this region, the two most important are the mode of dispersal and the conditions for establishment. Hurricanes and violent winds, water, birds, and the activities of man, such as those utilizing airplanes, boats, bulldozers, and automobiles, are unquestionably primary sources of seeds, spores, and vegetative parts. But the establishment of a species depends primarily upon the availability of a suitable habitat. For instance, only those species that can grow at low elevations can become established in the Bahamas; the highest altitude is 208 feet on Cat Island. Many pteridophytes need the protected, moist environment of solution pits or "banana holes" for their establishment, and these preferably should be in coppices.

Six species occur only in the Bahamian archipelago and in Florida. It is not possible to determine with absolute certainty the direction of their migration. But it is likely that they originated in the United States. These are *Pteris vittata* L., *Selaginella armata* Baker, *Tectaria lobata* (Poir.) Morton, *Thelypteris augescens*

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(Link) Munz & I. M. Johnst., and *T. ovata* R. St. John. *Osmunda regalis* var. *spectabilis* (Willd.) A. Gray, which also occurs rarely in Jamaica, should be placed in this category.

Only *Marsilea nashii* Underw. is strictly endemic in the region, from Great Inagua to Grand Turks.

Five other species are quite limited in their distribution and could be considered wide endemics. These include another sterile *Marsilea*, possible the Hispaniolan *M. berteroi* A. Br., from Acklin Island and South Caicos, *Anemia wrightii* Baker from Andros, also found in Cuba; *A. cicutaria* Kunze from Abaco, Andros and New Providence, also found in Cuba and Yucatán, *Selaginella bracei* Hieron. from Andros, also found in Cuba; and *Thelypteris cordata* (Fée) Proctor from Andros, also found in Jamaica. Apparently Cuba should be considered the point of origin for most of these species.

The remaining 30 species in the Bahamas also are found in Cuba, Hispaniola, and Puerto Rico. Many of these extend to islands in the Lesser Antilles, Jamaica, or even to Mexico, Central America, or South America. Most are found in southern Florida as well, with the exception of such species as *Polypodium squamatum* L. on Andros and *Schizaea poeppigiana* Sturm in dense coppices on Abaco. In my opinion, all of these have migrated northward into the Bahamian archipelago.

Those species that thrive best in association with the native pine *Pinus caribaea* Morelet (found on Abaco, Andros, Grand Bahama and New Providence, with a disjunct occurrence in the Caicos Islands) are *Anemia adiantifolia* (L.) Swartz, *Pteris longifolia* L., *Thelypteris normalis* (C. Chr.) Moxley, and *Pteridium aquilinum* var. *caudatum* (L.) Sadeb. The *Pteridium* frequently forms impenetrable masses in the "pineyards" on the northern islands. The northern *Osmunda regalis* var. *spectabilis* is found in fresh water marshes and ponds in the pinelands of Abaco. *Trismeria trifoliata* (L.) Diels is found in similar habitats on Grand Bahama and Abaco. *Blechnum serrulatum* L. C. Rich., *Acrostichum danaeifolium* Langsd. & Fisch., and *A. aureum* L. are found in less fresh water. All occasionally are found to some extent on islands devoid of pines, but they attain their optimum development when associated with pines.

Those islands or sections of islands devoid of pines, but which have an extensive coverage of broadleaf coppices, support various ferns in company with orchids and bromeliads. All occur on tree trunks, fallen logs, and on exposed rock ledges and walls. These are *Polypodium polypodioides* (L.) Watt, *P. heterophyllum* L., *P. phyllitidis* L. and its var. *latum* (Moore) Proctor, *P. plumula* Humb. & Bonpl. ex Willd., *Paltonium lanceolatum* (L.) Presl, and *Psilotum nudum* (L.) Pal. Beauv.

By far the greatest number of species occur in the solution pits, sink-holes, or "banana holes" that are formed in the limestone stratum common to all of the islands. The holes that support ferns usually occur in more shaded and more moist habitats than are found elsewhere on the islands. Although one or more species may often be found in these sinks, no single species can be said to occur in all fern-inhabited sinks. The four most frequently encountered are *Adiantum*

tenerum Swartz, *Tectaria lobata*, *Thelypteris normalis*, and *T. reptans* (J. F. Gmel.) Morton. In fact, some species are of singular occurrence and most are sporadic. These are *Pityrogramma calomelanos* (L.) Link on Andros, *Tectaria heracleifolia* (Willd.) Underw. on Grand Bahama and New Providence, and *Thelypteris dentata* (Forssk.) E. St. John on Great Exuma. Other such species with slightly more widespread distributions are *Adiantum melanoleucum* Willd., *Asplenium dentatum* L., *Psilotum nudum*, and *Sphenomeris clavata* (L.) Maxon.

The only genus of pteridophytes that might be considered a weed is *Nephrolepis*. The ruderal *N. exaltata* (L.) Schott is the most widespread, whereas *N. biserrata* (Swartz) Schott, *N. multiflora* (Roxb.) Jarrett ex Morton, and *N. rivularis* (Vahl) Mett. ex Krug are limited to only one or two localities.

A unique habitat, the leaf bases of old arborescent palmettos, is favored by two species: the rather widespread *Polypodium aureum* L. and the less common *Vittaria lineata* (L.) J. E. Smith, which is found only on Andros and New Providence. Although I have examined literally hundreds of palmettos hoping to find the Shoestring Fern, I have not been successful, mainly because most of the palms have been burned by malpais farming practices. My search for *Vittaria* recalls an interesting and most profitable trip that I made in company with Dr. E. T. Wherry and Mr. J. E. Benedict, Jr. in June, 1939, to central Georgia for the express purpose of seeing this species growing on clay cliffs. On our return northward into South Carolina, we visited the station for *Hymenophyllum tunbridgense* (L.) J. E. Smith in Oconee County, which I later reported (*Amer. Fern J.* 30: 21-27, 1940). I have many fond memories of my various field trips and associations with Dr. Wherry.

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